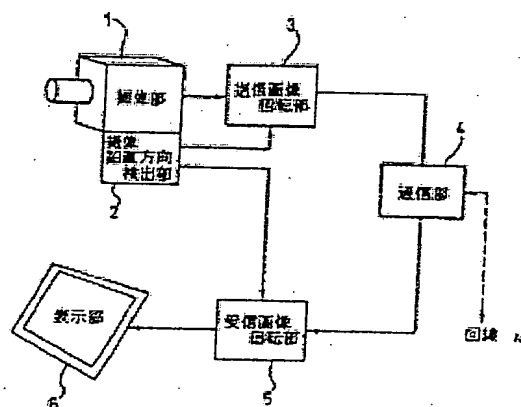


Patent number: WO0111881

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Abstract of WO0111881

A videophone device which changes the directions of a picked-up image and a displayed image according to the directions of an imaging unit and a display unit to always transmit or display a proper image, wherein the imaging unit (1) outputs image data of a picked-up object to a transmission image rotating unit (3). The transmission image rotating unit (3) rotates the picked-up image until the upper side in the vertical direction of the imaging unit (1) coincides with the upper side of an image to be transmitted to the destination based on the vertical direction of the imaging unit (1) detected by an image vertical direction detector (2), and creates an image signal. The image signal received from the sending side is demodulated to be output to a reception image rotating unit (5). The reception image rotating unit (5) rotates the received image until the upper side of the image coincides with the upper side in the vertical direction of the display unit (6) based on the vertical direction of the imaging unit (1) detected by the detector (2), that is, based on the direction of the display unit (6).



A...CIRCUIT  
1...IMAGER UNIT  
2...IMAGE VERTICAL DIRECTION DETECTOR  
3...TRANSMISSION IMAGE ROTATING UNIT  
4...COMMUNICATION UNIT  
5...RECEPTION IMAGE ROTATING UNIT  
6...DISPLAY UNIT

Description of corresponding document: EP1126709 (WO0111881)

<Technical Field>

The present invention relates to video telephone apparatus that transmits/receives image information and audio information.

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### <Background of the Invention>

In recent years, digital lines that can transmit/receive audio information and video information via a multichannel system such as the ISDN (integrated services digital network) have been in commercial use. In line with such a trend, the video telephone apparatus has come into widespread use. The video telephone apparatus is composed of at least transmitter means for transmitting images picket up via image pick-up means and associated voice data from the local party or user of the video telephone apparatus to the distant party, receiver means for receiving images and associated voice data from the distant party, and display means for displaying the images on a display and so on. While a liquid crystal panel is used as the display means based on the advantages of lightweight and low-profile design, the liquid crystal panel has a nature that it has a narrower angle of visibility than that of the CRT tube and that the angle of visibility differs between vertical direction and horizontal direction due to the properties of the liquid crystal material thus the angle on one side is further narrowed. As a result, there occurred such a problem as viewers in the center among a plurality of viewers could view a crisp image but the remaining viewers could not.

To solve such a problem, the Japanese Patent Laid-Open No. 56424/1993 disclosed video telephone apparatus comprising a selector circuit and a rotary plate. In this disclosure, the selector circuit was used to invert the inputs of picture signals to a horizontal side and a vertical side of the liquid crystal panel and the rotary plate was used to change the vertical-horizontal physical relationship of the liquid crystal display with the video telephone apparatus in order to conveniently view the images displayed on the crystal display panel formed in a rectangle whose vertical length differs from the horizontal length.

Fig. 9 shows the configuration of conventional video telephone apparatus. The conventional video telephone apparatus is composed of a crystal display panel 22 used as a monitor for displaying image information, a selector circuit 23 for switching between the horizontal direction and the vertical direction of an image displayed on the liquid crystal panel 22, and a rotary plate mounting the liquid crystal panel 22. The selector circuit 23 inverts the inputs of picture signals to a horizontal side and a vertical side of the liquid crystal panel 22 and switches between the horizontal direction and the vertical direction of an image displayed on the liquid crystal panel 22. The rotary plate 24 changes the vertical-horizontal physical relationship of the liquid crystal display 22 with the video telephone apparatus by rotating the liquid crystal panel mounted thereon.

Via such a configuration, it is possible for liquid crystal display such as a liquid crystal panel whose directivity of angle of visibility is inevitable to provide image display that efficiently uses the nature of the angle of visibility, by changing the vertical-horizontal relationship while properly maintaining the horizontal-vertical display relationship of an image.

When placing a call by using such video telephone apparatus, in particular a video telephone apparatus that can be transported, the user makes conversation with the receiver of the video telephone apparatus applied to his/her ear (hereinafter referred to as close-talking) or with the video telephone apparatus main unit placed on a desk, etc., without holding it in order to use the apparatus mainly as a video telephone set (hereinafter referred to as hands-free talking). The shape of portable video telephone apparatus is mostly a rod-like rectangular parallelepiped. In case the user makes conversation for example via hands-free talking, he/she often places video telephone apparatus in a fixed, stable state, that is, with the longitudinal direction of the enclosure placed horizontally or vertically with the mounting surface.

As mentioned earlier, the orientation of the video telephone apparatus main unit differs with the form of talking and the orientation of the image pick-up means and the display means provided on the video telephone apparatus main unit also differs accordingly. Thus, it is necessary to process and transmit an image picked up by image pick-up means so that the image may be in a normal orientation and the image may be displayed in a normal orientation on the display means.

However, via the aforementioned video telephone apparatus, it is impossible to change the orientation of an image picked up by image pick-up means (hereinafter simply referred to as a picked-up image) and change the orientation of an image received from the distant party (hereinafter referred to as a received image) on display means, according to the form of talking. Thus, problems arise that a picked-up image is transmitted to the distant party with the orientation of the image left unnatural and that the image is displayed in an unnatural orientation.

The invention solves the problems and aims at providing video telephone apparatus where the orientation of a picked-up image or a received image can be changed via the orientation of image pick-up means or display means so that a proper image can be always transmitted or displayed.

Another object of the invention is to provide video telephone apparatus that allows selection of proper receiver means and transmitter means appropriate according to the orientation of image pick-up means or display means, that is, selection between close-talking as a talking form where received voice data is regenerated by a receiver used in the close proximity of the user's ear and transmitted voice data is collected by a microphone used in the close proximity of the user's mouth, and hands-free talking where received voice data is regenerated by a receiver used away from the user's ears and transmitted voice data is collected by a microphone used away from the user's mouth.

#### <Disclosure of the Invention>

In order to attain the aforementioned objects, the invention has the following aspects:

(1) video telephone apparatus comprising image pick-up means for picking up the image of an object and generating a transmit picture signal according to the image of the object, communication means for transmitting and receiving said transmit picture signal and a receive picture signal, and display means for displaying video information based on the receive picture signal received from said communication means, characterized in that said video telephone apparatus comprises detector means for detecting the orientation of said video telephone apparatus and a rotating means for rotating the orientation of an image in at least either of said transmit picture signal and said receive picture signal.

In the video telephone apparatus according to the aspect (1), an image picked up by the image pick-up means and/or an image transmitted from the distant party is rotated according to the direction of the video telephone apparatus. Thus, a picked-up image is transmitted in a normal orientation and an image transmitted from the distant party is displayed in a normal orientation, even in case the video telephone apparatus is used in a variety of orientations according to the form of communications.

(2) video telephone apparatus according to the aspect (1), characterized in that detector means for detecting the orientation of said video telephone apparatus has image pick-up direction detector means for detecting the vertical direction of said iii.

In the video telephone apparatus according to the aspect (2), the orientation of the video telephone apparatus main unit and the orientation of the display means are determined by detecting the vertical direction of image pick-up means via image pick-up direction detector means. The video telephone apparatus rotates an picked-up image according to the orientation of the image pick-up means and rotates a received image transmitted from the distant party according to the orientation of the display means. Thus, a picked-up image is transmitted in a normal orientation and a received image transmitted from the distant party is displayed in a normal orientation.

(3) video telephone apparatus according to the aspect (1), characterized in that detector means for detecting the orientation of said video telephone apparatus has display direction detector means for detecting the vertical direction of said display means.

In the video telephone apparatus according to the aspect (3), the orientation of the video telephone apparatus main unit and the orientation of the image pick-up means are determined by detecting the vertical direction of the display means via display direction detector means. The display direction detector means rotates an picked-up image according to the orientation of the image pick-up means and rotates a received image transmitted from the distant party according to the orientation of the display means. Thus, a picked-up image is transmitted in a normal orientation and a received image transmitted from the distant party is displayed in a normal orientation.

(4) video telephone apparatus according to any of the aspects (1) through (3), characterized in that said rotating means has transmit image rotating means for performing rotation processing on said transmit picture signal based on the orientation of said video telephone apparatus.

In the video telephone apparatus according to the aspect (4), the orientation of the transmit

picture signal that is based on the picked-up image is rotated based on the orientation of the video telephone apparatus. Thus, a picked-up image is transmitted in a normal orientation even in case the video telephone apparatus is used in a variety of orientations according to the positioning for talking.

(5) video telephone apparatus according to any of the aspects (1) through (4), characterized in that said rotating means has receive image rotating means for performing rotation processing on said receive picture signal based on the orientation of said video telephone apparatus.

In the video telephone apparatus according to the aspect (5), the orientation of the receive picture signal that is based on the received image is rotated based on the orientation of the video telephone apparatus. Thus, a received image transmitted from the distant party is displayed in a normal orientation even in case the video telephone apparatus is used in a variety of orientations according to the form of talking.

(6) video telephone apparatus according to any of the aspects (1) through (5), characterized in that said video telephone apparatus comprises a first receiver means for regenerating a receive audio signal received from said communication means, a second receiver means for regenerating the receive audio signal received from said communication means to a signal level different from that of the first receiver means, and a receiver selector means for switching between said first receiver means and said second receiver means based on the orientation of said video telephone apparatus.

In the video telephone apparatus according to the aspect (6), switching is made between the first receiver means and the second receiver means based on the orientation of the video telephone apparatus. Thus, the user can make proper conversation according to the current situation via talking form of the video telephone apparatus.

Another configuration is possible where said first receiver means and said second receiver means are realized via single receiver means and the use form of the video telephone apparatus is detected based on the orientation of the video telephone apparatus to switch the signal level of an audio signal received via the receiver selector means. Thus, it is possible for the user to make conversation fit for the talking form of the video telephone apparatus via single receiver means.

(7) video telephone apparatus according to any of the aspects (1) through (6), characterized in that said video telephone apparatus comprises a first transmitter means for converting voice data into an electric signal to generate a transmit audio signal, a second transmitter means for converting voice data into an electric signal to generate a transmit audio signal whose signal level differs from that of the first receiver means, and a transmitter selector means for switching between said first transmitter means and said second transmitter means based on the orientation of said video telephone apparatus.

In the video telephone apparatus according to the aspect (7), switching is made between the first transmitter means and the second transmitter means based on the orientation of the video telephone apparatus. Thus, the user can make proper conversation according to the current situation via talking form of the video telephone apparatus.

Another configuration is possible where said first transmitter means and said second transmitter means are realized via single transmitter means and the use form of the video telephone apparatus is detected based on the orientation of the video telephone apparatus to switch the signal level of an audio-signal transmitted via the transmitter selector means. Thus, it is possible for the user to make conversation fit for the talking form of the video telephone apparatus via single transmitter means.

(8) video telephone apparatus according to the aspect (6), characterized in that said receiver selector means has picked-up image receiver means for switching between said first receiver means and said second receiver means based on the vertical direction of image pick-up means detected by image pick-up means detector means.

In the video telephone apparatus according to the aspect (8), the use form of the video telephone apparatus is detected based on the orientation of the iii, that is, the orientation of the video telephone apparatus main unit to switch between the first receiver means and the second receiver means. Thus, the user can make proper conversation fit for the current situation.

(9) video telephone apparatus according to the aspect (6), characterized in that said receiver selector means is display receiver selector means and switches between said first receiver means and said second receiver means based on the vertical direction or horizontal direction of the display means detected by display means detector means.

In the video telephone apparatus according to the aspect (9), the use form of the video telephone apparatus is detected based on the orientation of the display means, that is, the orientation of the video telephone apparatus main unit to switch between the first receiver means and the second receiver means. Thus, the user can make proper conversation according to the current situation via talking form of the video telephone apparatus.

(10) video telephone apparatus according to the aspect (7), characterized in that said transmitter selector means has picked-up image transmitter means for switching between said first transmitter means and said second transmitter means based on the vertical direction of image pick-up means detected by image pick-up means detector means.

In the video telephone apparatus according to the aspect (10), the use form of the video telephone apparatus is detected based on the orientation of the iii, that is, the orientation of the video telephone apparatus main unit to switch between the first transmitter means and the second transmitter means. Thus, the user can make proper conversation fit for the current situation.

(11) video telephone apparatus according to the aspect (7), characterized in that said transmitter selector means has display transmitter selector means for switching between said first transmitter means and said second transmitter means based on the vertical direction of display means detected by display means detector means.

In the video telephone apparatus according to the aspect (11), the use form of the video telephone apparatus is detected based on the orientation of the display means, that is, the orientation of the video telephone apparatus main unit to switch between the first transmitter

means and the second transmitter means. Thus, the user can make proper conversation according to the current situation via talking form of the video telephone apparatus.

#### <Brief Description of the Drawings>

Fig. 1 is a block diagram showing the configuration of video telephone apparatus according to the first embodiment of the invention.

Fig. 2 is a longitudinal section showing a configuration of the image pick-up vertical direction detector.

Fig. 3 is a perspective view showing a positioning example of video telephone apparatus main unit.

Fig. 4 is a perspective view showing a positioning example of video telephone apparatus main unit having a detachable image pick-up section.

Fig. 5 is a block diagram showing the configuration of video telephone apparatus according to the second embodiment of the invention.

Fig. 6 is a perspective view showing a configuration of video telephone apparatus main unit having a detachable display.

Fig. 7 is a block diagram showing the configuration of video telephone apparatus according to the third embodiment of the invention.

Fig. 8 is a block diagram showing the configuration of video telephone apparatus according to the fourth embodiment of the invention.

Fig. 9 is a block diagram showing the configuration of conventional video telephone apparatus.

In the figures are shown an image pick-up section 1, an image pick-up vertical direction detector 2, a transmit image rotating section 3, a communication section 4, a receive image rotating section 5, a display 6, a display vertical direction detector 13, a first receiver 14, a second receiver 15, a picked-up image transmitter selector 19, a display receiver selector 20, and a display transmitter selector 21.


#### <Best Mode for carrying Out the Invention>

Embodiment of the invention will be described referring to the drawings.

Video telephone apparatus according to embodiments of the invention is used as mobile communications apparatus such as a personal handy phone and a portable telephone set and in particular preferable to portable apparatus.

[First embodiment]

Video telephone apparatus according to the first embodiment can transmit and display a picked-up image and a received image in a normal state by rotating the picked-up image and the received image based on the vertical direction of iii, irrespective of the form of talking of the video telephone apparatus.

 Fig. 1 is a block diagram showing the configuration of video telephone apparatus according to the first embodiment of the invention. Fig. 2 is a longitudinal section showing a configuration of the image pick-up vertical direction detector. Fig. 3 is a perspective view showing a positioning example of video telephone apparatus main unit 10. Fig. 4 is a perspective view showing a positioning example of video telephone apparatus main unit 10 having a detachable image pick-up section 1b.

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As shown in Fig. 1, video telephone apparatus according to the first embodiment has an image pick-up section 1 corresponding to image pick-up means for picking up the image of an object and generating a picture signal according to the image of the object, an image pick-up vertical direction detector 2 corresponding to image pick-up direction detector means for detecting the vertical direction of the image pick-up section 1 and determining the orientation of the video telephone apparatus, a transmit image rotating section 3 corresponding to transmit image rotating means for receiving a picture signal from the image pick-up section 1 and performing rotation processing on the signal based on the vertical direction of the image pick-up section 1 detected by the image pick-up vertical direction detector 2, and a communication section 4 corresponding to communication means for modulating and transmitting a picture signal (transmit picture signal) to send from the local party via a communication circuit that is a radio link or a wired circuit.

The video telephone apparatus according to the first embodiment also has a communication section 4 for receiving and demodulating a picture signal (receive picture signal) sent from the distant party via a communication circuit that is a radio link or a wired circuit, and a receive image rotating section 5 corresponding to receive image rotating means for receiving the demodulated picture signal and performing rotation processing on the signal, a display 6 corresponding to display means for displaying as an image the picture signal that has undergone rotation processing. It is assumed that the orientation of the video telephone apparatus main unit, the image pick-up section and the display is the same as the orientation of the video telephone apparatus.



Receiving operation and transmitting operation of the video telephone apparatus will be described below.

(Transmitting operation)

When an image is transmitted, the image of an object is picked up by an image pick-up section 1 in the first place. The image pick-up section 1 further converts image data on the target object to an electric signal to generate a picture signal and output the picture signal to the transmit image rotating section 3. In this practice, the image pick-up vertical direction detector 2 detects the vertical direction of the image pick-up section 1 and outputs the results to the transmit image rotating section 3 and the receive image rotating section 5. The image pick-up vertical direction detector 2 detects the vertical direction by using a contact of mercury and an electrode. As shown in Fig. 2, the image pick-up vertical direction detector 2 is composed of an enclosure 7 composed of glass, etc., mercury 8 encapsulated within this enclosure 7, electrode pairs 9A, 9B, 9C, 9D provided on upper and lower left/right sections to penetrate the walls of the enclosure 7.

By the gravity of the mercury 8, the mercury 8 is placed in the lower section of the enclosure 7 and serves to short-circuit the electrode pair 9A as shown in the figure. The same applies to the other electrode pairs and the electrode pairs in the lower section of the enclosure are short-circuited by mercury. As a result, by detecting the short-circuit, it is possible to detect for example an electrode pair 9A in Fig. 2. The section short-circuited by mercury indicates the lower section of the enclosure in the vertical direction thus allowing detection of the vertical direction.

Referring to Fig. 1 again, the transmit image rotating section 3, on receiving information on the image pick-up section in the vertical direction thus detected and a picture signal of a picked-up image picked up by the image pick-up section, performs rotation processing on the picture signal so that the upper side of the picked-up image in the vertical direction of the image pick-up section 1, that is, the upper side of the object in the vertical direction may coincide with the upper side of the image to be transmitted to the distant party. The picture signal processed by the transmit image rotating section is modulated by the communication section 4 and transmitted to the distant party via a communication circuit.

The image pick-up vertical direction detector 2 is not limited to one that uses mercury shown in Fig. 2. Another method of detecting the vertical direction is for example an approach whereby the Haugh transform is used to draw the edge of the image obtained via the image pick-up section 1 and straight line appearing over a predetermined frequency are extracted to obtain statistics of the angles of the straight lines, with the straight line most frequently detected is assumed as the vertical direction.

When the image of an object is picked via the image pick-up section, buildings are a selected as

a background or an object itself. These buildings generally stand in vertical direction so that the picked-up image contains a great number of straight line in the vertical direction. Thus, it is possible to use the Haugh transform and to extract straight lines having a variety of angles included in the picked-up image then to assume the straight line of the most frequent angle as the vertical direction, thereby allowing detection of the vertical direction. However, the vertical direction detecting means using the Haugh transform gives the same results when rotated by 180 degrees. Thus, the positioning angle of the video telephone apparatus is limited within 90 degrees from the vertical orientation to the position where the right side is at the bottom. Detailed description of the Haugh transform is omitted because it is a well known technology.

(Receiving operation)

When an image is received, the picture signal received by the communication section 4 is demodulated and output to the receive image rotating section 5. The receive image rotating section 5 that has received the demodulated picture signal performs rotation processing on the picture signal so that the upper side of the received image is displayed at the upper side of the display 6 in the vertical direction, that is, so that the image transmitted from the distant party may be displayed normally at the local party, based on the vertical direction information of the image pick-up section 1 detected by the image pick-up vertical direction detector 2, that is, based on the information on the orientation of the video telephone apparatus main unit and the display 6. The picture signal that has undergone rotation processing is displayed as an image on the display 6.

Next, a first positioning example of video telephone apparatus according to this embodiment will be described referring to Fig. 3. In Fig. 3, video telephone apparatus according to the first example is composed of a video telephone apparatus main unit 10, an image pick-up section 1a provided in the video telephone apparatus main unit 10, an image pick-up vertical direction detector 2, and a display 6. The video telephone apparatus main unit 10 is placed as shown in the first to third positioning examples in Figs. 3 (a) through (c) when used hands-free. Description of the components in Fig. 3 that serve to act the same as the means shown in Fig. 1 is omitted.

Fig. 3 (a) is an example where the longitudinal direction of the video telephone apparatus main unit according to this embodiment is placed horizontally to the positioning surface so that the upper side (antenna) of the video telephone apparatus main unit may be on the left side in the figure. Further description assumes the positioning example of Fig. 3 (a) as a reference. In Fig. 3 (a), image data of the object 11 whose image was picked up by the image pick-up section 1a is transmitted in a normal orientation as a transmit image 12 without rotation processing. The image received via the communication section 4 is displayed in a normal orientation without rotation processing.

The second positioning example in Fig. 3 (b) shows a case where the image is rotated by 180

degrees from the first positioning example in Fig. 3 (a). In this case, the object whose image was picked up by the image pick-up section 1a is output as an image with the object 11 upside down to the transmit image rotating section 3. Thus, the transmit image rotating section 3 performs rotation processing on the picture signal so that the upper side of the image pick-up section 1a in the vertical direction, that is, the upper side of the object 11 in the vertical direction may coincide with the upper side of the image to be transmitted, and transmits the resulting signal as a transmit image 12 via the communication section 4 to the distant party.

The received image transmitted from the distant party and received by the communication section 4 will be displayed inverted by 180 degrees because the display 6a is inverted by 180 degrees from the normal orientation. Thus, the receive image rotating section 5 performs rotation processing on the picture signal so that the upper side of the received image may coincide with the upper side of the display 6a based on the vertical direction of the image pick-up section 1a detected by the image pick-up vertical direction detector 2, that is, based on the orientation information of the display 6a. Via this procedure, the picture signal that has undergone rotation processing is displayed in a normal orientation on the display 6a.

The third positioning example in Fig. 3 (c) shows a case where the first position of the video telephone apparatus main unit 10 shown in Fig. 3 (a) is rotated counterclockwise by 90 degrees. Thus, the image is rotated by the transmit image rotating section 3 so that the picked-up image is rotated clockwise by 90 degrees from the image in the reference direction (that is, the picked-up image picked up by the image pick-up section 1a in Fig. 3 (a)). The receive image rotating section 5 rotates the received image clockwise by 90 degrees from the image in the reference direction (that is, the image displayed on the display 6a in Fig. 3 (a)).

In this way, it is possible to make conversion according to the orientation of the image pick-up section 1a (that is, the orientation of the video telephone apparatus main unit) so that the upper side of the object whose image is picked up is always on the upper side of the image to transmit and so that the received image is normally displayed when the image is displayed on the display 6a in order to allow the user to transmit or display the normal image.

While the video telephone apparatus is equipped with a bent section and adapted to be collapsible, the invention is not limited to this configuration. While the image pick-up section 1a is provided on the button section around the bent section as shown in the figure, this configuration is not by way of limitation but the image pick-up section 1a may be also provided on the display 6a. The image pick-up section 1a may be adapted to be able to incline at a predetermined angle and provided to allow the user to pick up an image at any angle according to the user's position.

The image pick-up vertical direction detector 2a can be provided at the front or rear of the video telephone apparatus main unit 10 and the shown configuration is not by way of limitation.

A second positioning example of video telephone apparatus according to this embodiment will be described referring to Fig. 4. In Fig. 4, video telephone apparatus according to the second

example can transmit and display a picked-up image and a received image in a normal state by rotating the picked-up image and the received image, irrespective of the form of talking of the video telephone apparatus.

Figs. 4 (a) through (c) respectively show the first through third positioning examples where video telephone apparatus with a detachable image pick-up section 1b is used hands-free. Description of the components in Fig. 4 that serve to act the same as the means shown in the first example is omitted.

In Fig. 4, the video telephone apparatus is composed of image pick-up sections 1b attachably provided on the upper face (antenna side) and right and left sides of the video telephone apparatus main unit 10, an image pick-up vertical direction detector 2b that also serves as a connection terminal for the video telephone apparatus main unit 10 for detecting the vertical direction of the image pick-up section 1b via the terminal where the image pick-up section 1b is connected (that is, for detecting the orientation of the video telephone apparatus main unit and the orientation of the display), and a display 6b for displaying as an image the picture signal that has undergone rotation processing via a transmit image rotating section (not shown).

In the second example, the image pick-up section 1b is provided on the video telephone apparatus main unit detachably and determines the orientation of the video telephone apparatus main unit depending on which section of the video telephone apparatus main unit the image pick-up section 1b is inserted. In case the image pick-up section 1b is inserted in the right side of the video telephone apparatus, it is assumed that the video telephone apparatus is placed with the left side of the video telephone apparatus facing downward and the received image is rotated via the receive image rotating section 5 accordingly. It is not necessary to perform rotation processing on a picked image because the image pick-up section 1 is arbitrarily placed by the user so that the object image may be picked up in a normal orientation.

Fig. 4 (a) is an example where the longitudinal direction of the video telephone apparatus main unit according is placed horizontally to the positioning surface so that the upper side of the video telephone apparatus main unit may be on the left side in the figure. Assuming the positioning example of Fig. 4 (a) as a reference, image data of the object 11 whose image was picked up by the image pick-up section 1b is transmitted in a normal orientation as a transmit image 12 without rotation processing. The image received via the communication section 4 is displayed in a normal orientation without rotation processing.

The second positioning example in Fig. 4 (b) shows a case where the image is rotated by 180 degrees from the first positioning example in Fig. 4 (a). In this case, the received image transmitted from the distant party and received by the communication section 4 appears with the display 6b inverted by 180 degrees from the normal orientation, thus will be displayed as an image inverted by 180 degrees if rotation processing is not performed. Thus, the receive image rotating section 5 performs rotation processing on the picture signal that is based on the received image so that the upper side of the received image may coincide with the upper side of the display 6b based on the vertical direction of the image pick-up section 1b detected by the

image pick-up vertical direction detector 2b, that is, the orientation of the display 6b. Via this procedure, the image that has undergone rotation processing is displayed in a normal orientation on the display 6a.

The third positioning example in Fig. 4 (c) shows a case where the first position of the video telephone apparatus main unit 10 shown in Fig. 4 (a) is rotated counterclockwise by 90 degrees. Thus, the receive image rotating section 5 rotates the received image clockwise by 90 degrees from the image in the reference direction (that is, the image displayed on the display 6b in Fig. 4 (a)).

In this way, it is possible to detachably provide an image pick-up section 1b on the video telephone apparatus and detect the orientation of the video telephone apparatus main unit 10 and the orientation of the display 6b via the image pick-up vertical direction detector 2b that is a connecting terminal of the image pick-up section 1b. It is possible for the user to view a received image in a normal orientation by rotating the image so that the image may be displayed in a normal orientation according to the orientation of the display 6b.

#### [Second embodiment]

Video telephone apparatus according to the second embodiment of the invention can transmit and display a picked-up image and a displayed image in a normal state by rotating the picked-up image and the displayed image based on the vertical direction of display means, irrespective of the form of talking of the video telephone apparatus.

Fig. 5 is a block diagram showing the configuration of video telephone apparatus according to the second embodiment of the invention. Fig. 6 is a perspective view showing a configuration of video telephone apparatus main unit having a detachable display 6c. Description of the components in the figures that serve to act the same as the means included in the first embodiment is omitted.

As shown in Fig. 5, video telephone apparatus according to the second embodiment has an image pick-up section 1 for picking up the image of an object and generating a picture-signal according to the image of the object, a transmit image rotating section 3 for receiving a picture signal from the image pick-up section 1 and performing rotation processing on the signal, and a communication section 4 for modulating and transmitting a picture signal to send from the local party via a communication circuit that is a radio link or a wired circuit.

The video telephone apparatus according to the second embodiment also has a communication section 4 for receiving and demodulating a picture signal received via a communication circuit that is a radio link or a wired circuit, a display vertical direction detector 13 corresponding to the display direction detector means for detecting the vertical direction of the display 6 and determining the orientation of the video telephone apparatus main unit, a

receive image rotating section 5 for receiving the demodulated picture signal and performing rotation processing on the signal based on the vertical direction of the display 6 detected by said display vertical direction detector 13, and a display 6 for displaying as an image the picture signal that has undergone rotation processing. It is assumed that the orientation of the video telephone apparatus main unit, the image pick-up section and the display is the same as the orientation of the video telephone apparatus.

As a transmitting operation, the image of an object is picked up by an image pick-up section 1 in the first place. The image pick-up section 1 further converts image data on the target object to an electric signal to generate a picture signal and output the picture signal to the transmit image rotating section 3. In this practice, the display vertical direction detector 13 detects the vertical direction of the display 6, that is the orientation of the video telephone apparatus main unit and the orientation of the image pick-up section 1 and outputs the results to the transmit image rotating section 3 and the receive image rotating section 5. The display vertical direction detector 13 may be one similar to that shown in Fig. 2.

Next, the transmit image rotating section 3, on receiving information on the vertical direction of the display, that is, the orientation of the image pick-up section and a picture signal of a picked-up image picked up by the image pick-up section, performs rotation processing on the picture signal so that the upper side of the picked-up image in the vertical direction of the image pick-up section 1 may coincide with the upper side of the image to be transmitted to the distant party. The picture signal processed by the transmit image rotating section 3 is modulated by the communication section 4 and transmitted to the distant party via a communication circuit.

As a receiving operation, the picture signal received by the communication section 4 is demodulated and output to the receive image rotating section 5. The receive image rotating section 5 performs rotation processing on the picture signal so that the upper side of the received image is displayed at the upper side of the display 6 in the vertical direction, that is, so that the image transmitted from the distant party may be displayed normally at the local party, based on the vertical direction information of the display 6 detected by the display vertical direction detector 13.

Next, a positioning example of video telephone apparatus according to this embodiment will be described referring to Fig. 6.

In Fig. 6, video telephone apparatus is composed of an image pick-up section 1c, a display vertical direction detector 13a that also serves as a connection terminal for the video telephone apparatus main unit 10 for detecting the vertical direction of the display 6c via the terminal where the display 6c is connected (that is, for detecting the orientation of the video telephone apparatus main unit), and displays 6c detachably provided on the video telephone apparatus main unit and provided on the upper face (antenna side) and right and left sides of the video telephone apparatus main unit 10. Figs. 6 (a) through (c) show the first to third positioning examples of video telephone apparatus main unit 10 when used hands-free. Description of the components in Fig. 6 that serve to act the same as the means shown in Fig. 5 is omitted.

The display 6c according to an embodiment in Fig. 6 is provided on the video telephone apparatus main unit detachably and determines the orientation of the video telephone apparatus main unit depending on which section of the video telephone apparatus main unit the display 6c is inserted. In case the display 6c is inserted in the right side of the video telephone apparatus, it is assumed that the video telephone apparatus is placed with the left side of the video telephone apparatus facing downward and the picked-up image is rotated via the transmit image rotating section 5 accordingly. It is not necessary to perform rotation processing on a picked image because the display 6c is arbitrarily placed by the user so that the object image may be displayed in a normal orientation.

Fig. 6 (a) is an example where the longitudinal direction of the video telephone apparatus main unit is placed horizontally to the positioning surface so that the upper side of the video telephone apparatus main unit may be on the left side in the figure. Assuming the positioning example of Fig. 6 (a) as a reference, image data of the object 11 whose image was picked up by the image pick-up section 1 is transmitted in a normal orientation as a transmit image 12 without rotation processing. The image received via the communication section is displayed in a normal orientation.

The second positioning example in Fig. 6 (b) shows a case where the image is rotated by 180 degrees from the first positioning example in Fig. 6 (a). In this case, the object whose image was picked up by the image pick-up section 1c is output as an image with the object 11 upside down to the transmit image rotating section 3. Thus, the transmit image rotating section 3 performs rotation processing on the picture signal of the object so that the upper side of the image pick-up section 1c in the vertical direction, that is, the upper side of the object in the vertical direction may coincide with the upper side of the image to be transmitted, based on the vertical direction of the display 6c detected by the display vertical direction detector 13a, and transmits the resulting signal as a transmit image 12 via the communication section 4 to the distant party.

The third positioning example in Fig. 6 (c) shows a case where the first position of the video telephone apparatus main unit 10 shown in Fig. 6 (a) is rotated counterclockwise by 90 degrees. Thus, the image is rotated by the transmit image rotating section so that the picked-up image is rotated clockwise by 90 degrees from the image in the reference direction (that is, the picked-up image picked up by the image pick-up section 1c in Fig. 6 (a)).

In this way, it is possible to detachably provide a display 6c on the video telephone apparatus and detect the orientation of the video telephone apparatus main unit 10 and the orientation of the image pick-up section 1c via display vertical direction detector 13c that is a connecting terminal of the display 6b. It is possible for the user to transmit an image in a normal orientation by making conversion according to the orientation of the image pick-up section 1c so that the upper side of the object whose image is picked up is always on the upper side of the image to transmit.

While the display 6c is detachable and the display vertical direction detector 13a serves as a connection terminal for the display 6c in Fig. 6, this is not by way of limitation but a display vertical direction detector may be separately provided at the rear or front of the video telephone apparatus main unit 10 in a variant. In this case, it is necessary to rotate a received image via the receive image rotating section 5 based on the vertical direction of the display 6c of the display vertical direction detector 13a and make sure that the image is displayed in a normal orientation.

While the video telephone apparatus is a rectangular parallelepiped with a bent section and collapsible in the first and second embodiments of the invention, this is not by way of limitation but the orientation of a picked-up image can be converted as required according to the orientation of the image pick-up and the orientation of a received image to display can be converted as required according to the orientation of the display.

#### [Third embodiment]

Video telephone apparatus according to the third embodiment can transmit and display a picked-up image and a received image in a normal state by rotating the picked-up image and the received image based on the vertical direction of iii, irrespective of the form of talking of the video telephone apparatus. Further, the video telephone apparatus according to the third embodiment can generate voice data to transmit to the distant party via communication means and voice data received from the distant party via communication means according to the form of talking of the video telephone apparatus.

Fig. 7 is a block diagram showing the configuration of video telephone apparatus according to the third embodiment of the invention. Components in the figure that serve to act the same as the means included in the first and second embodiments are given the same numbers and the corresponding description is omitted.

As shown in Fig. 7, video telephone apparatus according to the third embodiment of the invention has an image pick-up section 1 for picking up the image of an object and generating a picture signal according to the image of the object, an image pick-up vertical direction detector 2 for detecting the vertical direction of the an image pick-up section 1, a transmit image rotating section 3 for receiving a picture signal from the image pick-up section 1 and performing rotation processing on the signal, and a communication section 4 for transmitting/receiving and modulating/demodulating a picture signal via a communication circuit that is a radio link or a wired circuit, a receive image rotating section 5 for receiving the demodulated picture signal and performing rotation processing on the signal, and a display 6 for displaying as an image the picture signal that has undergone rotation processing.

The video telephone apparatus according to the third embodiment also has a first receiver 14 corresponding to first receiver means as a close-talking receiver, a second receiver 15



corresponding to second receiver means as a speaker for hands-free talking, a picked-up image receiver selector 16 corresponding to picked-up image receiver selector means, a first transmitter 17 corresponding to first transmitter means as a close-talking microphone, a second transmitter 18 corresponding to second transmitter means as a hands-free microphone, and a picked-up image transmitter selector 19 corresponding to picked-up image transmitter selector means. The second receiver 15 has an audio circuit whose amplification ratio differs from that of the first receiver 14 and regenerates an audio signal received from the communication section to a signal level that differs from that of the first receiver 14. The second transmitter 18 has an amplification ratio different from that of the first transmitter 17 and regenerates an input audio signal to a signal level that differs from that of the first receiver 14. It is assumed that the orientation of the video telephone apparatus main unit, the image pick-up section and the display is the same as the orientation of the video telephone apparatus.

The picked-up image receiver selector 16 selects the first receiver 14 as a close-talking receiver when the orientation of the video telephone apparatus main unit is fit for close-talking as shown in Fig. 3 (c), Fig. 4 (c) or Fig. 6 (c) and selects the second receiver 15 as a hands-free receiver when the orientation of the video telephone apparatus main unit is fit for hands-free talking as shown in Fig. 3 (a), Fig. 3 (b), Fig. 4 (a), Fig. 4 (b), Fig. 6 (a) or Fig. 6 (b), based on the output results of the image pick-up vertical direction detector 2, that is, the orientation of the video telephone apparatus main unit.

In case the image pick-up section 1 is detachable, the picked-up image receiver selector 16 may select the second receiver 15 as a hands-free receiver when the image pick-up section 1 is attached to the video telephone apparatus main unit and the first receiver 14 as a close-talking receiver when the image pick-up section 1 is not attached to the video telephone apparatus main unit

It is also possible to paste the image pick-up section 1 with the first receiver 14 as a close-talking receiver back to back and attach the resulting component rotatably on the video telephone apparatus main unit so that the second receiver 15 is selected when the image pick-up section 1 is in the same direction as the front direction of the video telephone apparatus and the first receiver 14 is selected when the first receiver 14 is in the same direction as the front direction of the video telephone apparatus via rotating operation of the operator. The first receiver and the second receiver may not be separate but share the same speaker and the amplification ratio of the received audio signal is switched to regenerate the audio signal to two separate signal levels, based on the output results of the image pick-up vertical direction detector 2.

Same as the picked-up image receiver selector 16, the picked-up image transmitter selector 19 selects the first transmitter 17 as a close-talking microphone when the orientation of the video telephone apparatus main unit is fit for close-talking and selects the second transmitter 18 as a hands-free microphone when the orientation of the video telephone apparatus main unit is fit for hands-free talking, based on the output results of the image pick-up vertical direction detector 2, that is, the orientation of the video telephone apparatus main unit.

In case the image pick-up section 1 is detachable, the picked-up image transmitter selector 19 may select the second receiver 15 as a hands-free microphone when the image pick-up section 1 is attached to the video telephone apparatus main unit and the first transmitter 18 as a close-talking microphone when the image pick-up section 1 is not attached to the video telephone apparatus main unit.

It is also possible to paste the image pick-up section 1 with the first transmitter 17 as a close-talking microphone back to back and attach the resulting component rotatably on the video telephone apparatus main unit so that the second transmitter 18 is selected when the image pick-up section 1 is in the same direction as the front direction of the video telephone apparatus and the first transmitter 18 is selected when the first transmitter 18 is in the same direction as the front direction of the video telephone apparatus via rotating operation of the operator. The first transmitter and the second transmitter may not be separate but share the same microphone and the amplification ratio of the input audio signal is switched to regenerate the audio signal to two separate signal levels, based on the output results of the image pick-up vertical direction detector 2.

In the aforementioned configuration, when transmitting voice data, the picked-up image transmitter selector 19 receives the vertical direction of the image pick-up section 1 from the image pick-up vertical direction detector means 2 and selects and enables the first transmitter 17 or the second transmitter 18 based on the vertical direction of the image pick-up section 1, that is, the orientation of the video telephone apparatus main unit, receives the transmit audio signal output from the selected receiver means, then outputs the signal to the communication section 4.

The communication section 4, on receiving the generated transmit signal together with a picture signal output from the transmit image rotating section 3, modulates the both signals and transmits the resulting signals to the distant party via a communication circuit.

On the other hand, when receiving voice data, the communication section 4 demodulates a received picture signal and an audio signal and outputs the resulting signals to the receive image rotating section 5 and the picked-up image receiver selector 16 respectively. The picked-up image receiver selector 16 selects the first receiver or the second receiver based on the vertical direction of the image pick-up section 1 from the image pick-up vertical direction detector means 2, that is, the orientation of the video telephone apparatus main unit, and outputs the receive audio signal output from the communication section 4 to the selected receiver means. The signal is regenerated to an audio signal fit for the form of talking of the video telephone apparatus via the receiver means.

In this way, it is possible for the user to transmit an image in a normal orientation by making conversion according to the orientation of the image pick-up section 1, that is, the orientation of the video telephone apparatus main unit, so that the upper side of the object whose image is picked up is always on the upper side of the image to transmit and that the received image is

displayed in a normal orientation on the display 6.

It is possible to switch between receiver means and between transmitter means according to the orientation of the video telephone apparatus main unit thus allowing the user to make proper conversation fit for the form of talking.

[Fourth embodiment]

Video telephone apparatus according to the fourth embodiment can transmit and display a picked-up image and a received image in a normal state by rotating the picked-up image and the received image based on the vertical direction of display means, irrespective of the form of talking of the video telephone apparatus. Further, the video telephone apparatus according to the fourth embodiment can generate voice data to transmit to the distant party via communication means and voice data received from the distant party via communication means according to the form of talking of the video telephone apparatus.

Fig. 8 is a block diagram showing the configuration of video telephone apparatus according to the fourth embodiment of the invention. Components in the figure that serve to act the same as the means included in the first through third embodiments are given the same numbers and the corresponding description is omitted.

As shown in Fig. 8, video telephone apparatus according to the fourth embodiment of the invention has an image pick-up section 1 for picking up the image of an object, a transmit image rotating section 3 for performing rotation processing on the signal whose image is picked up, and a communication section 4 for transmitting/receiving and modulating/demodulating a picture signal, a display vertical direction detector 13 for detecting the vertical direction of the display 6, a receive image rotating section 5 for performing rotation processing on a received picture signal, and a display 6 for displaying as an image the picture signal that has undergone rotation processing.

The video telephone apparatus according to the fourth embodiment also has a first receiver 14 as a close-talking receiver, a second receiver 15 as a speaker for hands-free talking, a display receiver selector 20 corresponding to display receiver selector means, a first transmitter 17 as a close-talking microphone, a second transmitter 18 as a hands-free microphone, and a display transmitter selector 21 corresponding to display transmitter selector means. It is assumed that the orientation of the video telephone apparatus main unit, the image pick-up section and the display is the same as the orientation of the video telephone apparatus.

The display receiver selector 20 selects the first receiver 14 as a close-talking receiver when the orientation of the video telephone apparatus main unit is fit for close-talking and selects the second receiver 15 as a hands-free receiver when the orientation of the video telephone apparatus main unit is fit for hands-free talking, based on the output results of the display

vertical direction detector 13, that is, the orientation of the video telephone apparatus main unit.

In case the display 6 is detachable, the display receiver selector 20 may select the second receiver 15 for hands-free talking when the display 6 is attached to the video telephone apparatus main unit and the first receiver 14 for close-talking when the display 6 is not attached to the video telephone apparatus main unit.

It is also possible to paste the display 6 with the first transmitter 17 for close-talking back to back and attach the resulting component rotatably on the video telephone apparatus main unit so that the second transmitter 18 is selected when the display 6 is in the same direction as the front direction of the video telephone apparatus and the first transmitter 17 is selected when the first transmitter 17 is in the same direction as the front direction of the video telephone apparatus via rotating operation of the operator. The first transmitter and the second transmitter may not be separate but share the same microphone and the amplification ratio of the input audio signal is switched to regenerate the audio signal to two separate signal levels, based on the output results of the display vertical direction detector 13.

In the aforementioned configuration, when transmitting voice data, the display transmitter selector 21 receives the vertical direction of the display 6 from the display vertical direction detector 13 and selects and enables the first transmitter 17 or the second transmitter 18 based on the vertical direction of the display 6, that is, the orientation of the video telephone apparatus main unit. The display transmitter selector 21 generates a transmit audio signal based on the voice data output from the selected transmitter means, then outputs the signal to the communication section 4.

The communication section 4, on receiving the generated transmit signal together with a picture signal processed by the transmit image rotating section, modulates the both signals and transmits the resulting signals to the distant party via a communication circuit.

On the other hand, when receiving voice data, the communication section 4 demodulates a received picture signal and an audio signal and outputs the resulting signals to the receive image rotating section 5 and the display receiver selector 20 respectively. The display receiver selector 20 selects the first receiver or the second receiver based on the vertical direction of the display 6 from the display vertical direction detector 13, that is, the orientation of the video telephone apparatus main unit, and outputs the receive audio signal output from the communication section 4 to the selected receiver means. The signal is regenerated to an audio signal fit for the form of talking of the video telephone apparatus via the receiver means.

In this way, it is possible for the user to transmit an image in a normal orientation by making conversion according to the orientation of the display 6, that is, the orientation of the video telephone apparatus main unit, so that the upper side of the object whose image is picked up is always on the upper side of the image to transmit and that the received image is displayed in a normal orientation on the display 6.

It is possible to switch between receiver means and between transmitter means according to the state of the display 6 thus allowing the user to make proper conversation fit for the form of talking.

<Industrial Applicability>

As mentioned earlier, the invention has advantages that it possible to provide video telephone apparatus where the orientation of a picked-up image or a received image can be changed according to the orientation of the image pick-up section or the display, thus allowing transmission or display of a proper image at any time.

Via the invention, it is possible to select receiver means and transmitter means fit for the orientation of the image pick-up means or the display means.

Claims of corresponding document: EP1126709(WO0111881)

1. Video telephone apparatus comprising image pick-up means for picking up the image of an object and generating a transmit picture signal according to the image of the object, communication means for transmitting and receiving said transmit picture signal and a receive picture signal, and display means for displaying video information based on the receive picture signal received from said communication means, characterized in that said video telephone apparatus comprises detector means for detecting the orientation of said video telephone apparatus and a rotating means for rotating the orientation of an image in at least either of said transmit picture signal and said receive picture signal.
2. Video telephone apparatus according to claim 1, characterized in that detector means for detecting the orientation of said video telephone apparatus has image pick-up direction detector means for detecting the vertical direction of said iii.
3. Video telephone apparatus according to claim 1, characterized in that detector means for detecting the orientation of said video telephone apparatus has display direction detector means for detecting the vertical direction of said display means.
4. Video telephone apparatus according to any of the claims 1 through 3, characterized in that said rotating means has transmit image rotating means for performing rotation processing on said transmit picture signal based on the orientation of said video telephone apparatus.
5. Video telephone apparatus according to any of the claims 1 through 4, characterized in that said rotating means has receive image rotating means for performing rotation processing on said receive picture signal based on the orientation of said video telephone apparatus.

6. Video telephone apparatus according to any of the claims 1 through 5, characterized in that said video telephone apparatus comprises a first receiver means for regenerating a receive audio signal received from said communication means, a second receiver means for regenerating the receive audio signal received from said communication means to a signal level different from that of the first receiver means, and a receiver selector means for switching between said first receiver means and said second receiver means based on the orientation of said video telephone apparatus.

7. Video telephone apparatus according to any of the claims 1 through 6, characterized in that said video telephone apparatus comprises a first transmitter means for converting voice data into an electric signal to generate a transmit audio signal, a second transmitter means for converting voice data into an electric signal to generate a transmit audio signal whose signal level differs from that of the first receiver means, and a transmitter selector means for switching between said first transmitter means and said second transmitter means based on the orientation of said video telephone apparatus.

8. Video telephone apparatus according to claim 6, characterized in that said receiver selector means has picked-up image receiver means for switching between said first receiver means and said second receiver means based on the vertical direction of image pick-up means detected by image pick-up means detector means.

9. Video telephone apparatus according to claim 6, characterized in that said receiver selector means is display receiver selector means and switches between said first receiver means and said second receiver means based on the vertical direction or horizontal direction of the display means detected by display means detector means.

10. Video telephone apparatus according to claim 7, characterized in that said transmitter selector means has picked-up image transmitter means for switching between said first transmitter means and said second transmitter means based on the vertical direction of image pick-up means detected by image pick-up means detector means.

11. Video telephone apparatus according to claim 7, characterized in that said transmitter selector means has display transmitter selector means for switching between said first transmitter means and said second transmitter means based on the vertical direction of display means detected by display means detector means.

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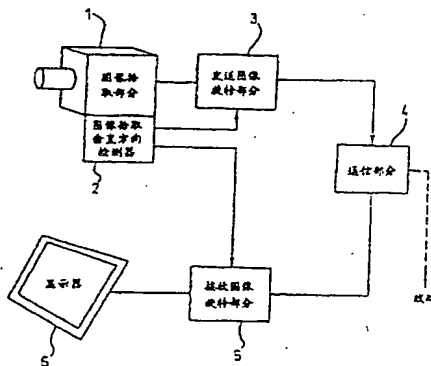
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[54] 发明名称 可视电话设备

[57] 摘要

可视电话设备,根据图像单元和显示单元的方向改变拾取图像和显示图像的方向以便发送或显示合适的图像,其中图像单元(1)将拾取对象的图像数据输出到发送图像旋转单元(3)。根据由图像垂直方向检测器(2)检测的图像单元(1)的垂直方向,发送图像旋转单元(3)旋转所拾取的图像直到图像单元(1)的垂直方向上的上端与将要发送到目的地的图像的上端相一致,并产生图像信号。从发送端接收的图像信号被解调以便被输出到接收图像旋转单元(5)。根据由检测器(2)检测的图像单元(1)的垂直方向,即根据显示器单元(6)的方向,接收图像旋转单元(5)旋转所接收的图像直到显示器单元(6)的垂直方向上的上端与图像的上端相一致。



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图 1 示出了根据本发明第一实施例的可视电话设备的配置的框图。图 2 示出了图像拾取垂直方向检测器的配置的纵向部分。图 3 示出了可视电话设备主单元 10 例子的位置的透视图。图 4 示出了具有可拆卸的图像拾取部分 1b 的可视电话设备主单元 10 例子的位置的透视图。

5 如图 1 所示, 根据第一实施例的可视电话设备具有相应于用于拾取对象图像并根据对象图像产生画面信号的图像拾取装置的图像拾取部分 1; 相应于用于检测图像拾取部分 1 的垂直方向并确定可视电话设备的方位的图像拾取方向检测器装置的图像拾取垂直方向检测器 2; 相应于用于接收来自图像拾取装置的画面信号并对基于由图像拾取垂直方向检测器 2 检测的图像拾取  
10 部分 1 的垂直方向的信号执行旋转处理的发送图像旋转装置的发送旋转装置 3; 以及相应于用于调制并发送画面信号 (发送画面信号) 以从当地用户通过无线或有线的通信电路发送的通信装置的通信部分 4。

根据第一实施例的可视电话设备还具有用于接收和解调从远程用户通过无线或有线的通信电路发送的画面信号 (接收画面信号) 的通信部分 4; 以  
15 及相应于用于接收解调的画面信号并对该信号执行旋转处理的接收图像旋转装置的接收图像旋转部分 5; 相应于用于将已进行了旋转处理的画面信号作为图像显示的显示装置的显示器 6。假设可视电话设备主单元、图像拾取部分和显示器的方位和可视电话设备的方位是相同的。

下面将描述可视电话设备的接收操作和发送操作。

20 (发送操作)

当发送图像时, 首先由图像拾取部分 1 拾取一对象图像。图像拾取部分 1 还将目标对象上的图像数据转换成电信号以产生画面信号并输出该画面信号到发送图像旋转部分 3。在这个实例中, 图像拾取垂直方向检测器 2 检测图像拾取部分 1 的垂直方向并输出结果到发送旋转部分 3 和接收图像旋转部  
25 分 5。图像拾取垂直方向检测器 2 通过使用汞和电极的接触来检测图像拾取部分 1 的垂直方向。如图 2 所示, 图像拾取垂直方向检测器 2 包括由玻璃等组成的壳 7, 汞 8 被封在壳 7 中, 位于上、下、左、右部分的电极对 9A、9B、9C、9D 穿过壳 7。

由于汞 8 的重力, 汞 8 位于壳 7 的较低的部分并用于短路如图所示的电极对 9A, 如图所示。其余的电极对同样并且在机壳较低部分的电极对被汞短路。结果, 通过检测短路, 就可以检测例如图 2 中的电极对 9A。通过汞短路  
30



的部分表明亮的较低的部分处于垂直方向，因此允许垂直方向的检测。

再参考图 1，发送图像旋转部分 3，通过在接收检测的垂直方向内的图像拾取部分上的信息以及接收由图像拾取部分拾取的所拾取的图像的画面信号，执行对画面信号的旋转处理以便拾取的图像的上端在图像拾取部分 1 的垂直方向，即，在垂直方向的对象的上端可以和将要发送到远程用户的图像的上端一致。由发送图像旋转部分处理的画面信号被通信部分 4 调制并通过通信电路被发送到远程用户。

图像拾取垂直方向检测器 2 不局限于图 2 所示的使用汞的那一种。另一种检测垂直方向的方法是例如下述的方法：通过 Haugh 变换绘出通过图像拾取部分 1 获得的图像的边缘，以及析取在预定频率上出现的直线被以获得直线的角度的统计值，最频繁地检测到的直线被假设作为垂直方向。

当通过图像拾取部分拾取对象图像时，建筑物被选做背景或对象自身。这些建筑物通常垂直方向矗立，这样拾取的图像包含垂直方向上的许多直线。因此，使用 Haugh 变换可能的，并且析取包括在拾取的图像内的具有许多具有不同角度的直线，然后假设最常出现的角度度的直线作为垂直方向，因此允许垂直方向的检测。但是当旋转 180 度时，使用 Haugh 变换垂直方向检测装置给出相同的结果。于是，可视电话设备的位置角度被局限在从垂直方位到直角边处在底面的位置的 90 度范围内。Haugh 变换的详细描述省略，因为它是众所周知的技术。

## 20 (接收操作)

当接收图像时，通过通信部分 4 接收的画面信号被解调并输出到接收图像旋转部分 5。已接收了解调画面信号的接收图像旋转部分 5 在画面信号上执行旋转处理以便接收的图像的上端在垂直方向上被显示在显示器 6 的上端，亦即，根据由图像拾取垂直方向检测器 2 检测的图像拾取部分 1 的垂直方向信息，即，根据可视电话主单元和显示器 6 上的方位的信息以便从远程用户发送的图像可以被正常地显示在当地用户上。已经过旋转处理的画面信号作为图像被显示在显示器 6 上。

下面，将参照图 3 描述根据这个实施例的可视电话设备的第一配置例子。在图 3 中，根据第一例子的可视电话设备包括可视电话主单元 10、在可视电话主单元 10 中提供的图像拾取部分 1a、图像拾取垂直方向检测器 2 和显示器 6。当使用免提时，可视电话设备主单元 10 按在图 3 的 (a) 到 (c) 中第一

到第三的配置放置。和图 1 中所示的装置的功能相同的图 3 中的部件的描述将省略。

图 3 (a) 的例子是：根据这个实施例的的可视电话设备主单元的纵向方向被水平放置到配置面以便可视电话设备主单元的上端（天线）可以位于图中左侧。进一步的描述假设是以图 3 (a) 的例子中的配置作为参考。在图 3 (a) 中，由图像拾取部分 1a 拾取的对象 11 的图像的图像数据作为未进行旋转处理的发送图像 12 以正常方位被发送。通过通信部分 4 接收的图像不经过旋转处理以正常方位被显示。

图 3 (b) 中的第二配置的例子示出了当图 3 (a) 中的第一配置的例子图像被旋转 180 度的图像的情况。在这个情况中，其图像由图像拾取部分 1a 拾取的对象作为对象 11 的上部向下的一个图像被输出到发送图像旋转部分 3。因此，发送图像旋转部分 3 对该画面信号执行旋转处理以便图像拾取部分 1a 的上部在垂直方向上，即，在垂直方向的对象 11 的上部可以和将被发送的图像的上部相一致，并通过通信部分 4 将处理结果的信号作为发送图像 12 发送到远程用户。

因为显示器 6a 被从正常方位旋转了 180 度，所以从远程用户发送的所接收的和由通信部分 4 接收的图像将反转 180 度被显示。因此，接收图像旋转部分 5 对画面信号执行旋转处理，以便根据由图像拾取垂直方向检测器 2 检测的图像拾取部分 1a 的垂直方向，即，根据显示器 6a 的方位信息，使接收的图像的上端可以和显示器 6a 的上端一致。通过这个步骤，已经过旋转处理的画面信号被以正常方位显示在显示器 6a 上。

图 3 (c) 中的第三配置的例子示出了当图 3 (a) 中所示的可视电话设备主单元 10 的第一配置被逆时针旋转 90 度的例子的情况。因此，发送图像旋转部分 3 旋转图像以便所拾取的图像从参考方向中的图像（即，由图 3 (a) 中的图像拾取部分 1a 拾取的所拾取的图像）按顺时针方向被旋转 90 度。接收图像旋转部分 5 从参考方向中的图像（即，由图 3 (a) 中的显示器 6a 上显示的图像）按顺时针方向将接收的图像旋转 90 度。

使用这种方法，根据图像拾取部分 1a 的方位（即，可视电话主单元的方位）进行会话是可能的，因此被拾取图像的对象的上端总是位于要发送的图像的上端并且当为了允许用户发送或显示正常图像，图像被显示在显示器 6a 上时，接收的图像被正常地显示。

当可视电话设备安装有弯曲部分并适用于可折叠时，本发明不局限于此种配置。当图像拾取部分 1a 是如图所示由在弯曲部分周围的按键部分提供时，这种配置也不限制本发明，但是图像拾取部分 1a 也可以在显示器 6a 上提供。图像拾取部分 1a 可以适应能够以预定角度的倾斜并且可以允许用户根据自身的位置以任意角度拾取图像。

图像拾取垂直方向检测器 2a 能够被提供在可视电话设备主单元的前部或后部并不受所示的配置限制。

根据这个实施例的可视电话设备的第二配置例子将参考图 4 来描述。在图 4 中，根据第二例子的可视电话设备可以通过旋转所拾取的图像和所接收的图像按照正常状态发送所拾取的图像和显示所接收的图像，而不管可视电话设备的交谈形式。

图 4 (a) 到 (c) 分别示出了第一到第三配置例子，其中具有可拆卸图像拾取部分 1b 的可视电话设备是使用免提形式。和第一例子中所示的装置的功能相同的图 4 中的部件的描述将省略。

在图 4 中，可视电话设备包括图像拾取部分 1b，其可连接在上部端面(天线端)和可视电话设备主单元 10 的左端和右端；图像拾取垂直方向检测器 2b，也作为可视电话设备主单元 10 的连接端子，用于通过图像拾取部分 1b 被连接的端子来检测图像拾取部分 1b 的垂直方向(即，用于检测可视电话设备主单元的方位和显示的方位)；以及显示器 6b，用于将通过发送图像旋转部分(未示出)已经过旋转处理的画面信号作为一个图像进行显示。

在第二例子中，图像拾取部分 1b 被可拆卸地提供在可视电话设备主单元上并且根据图像拾取部分 1b 被插入在可视电话设备主单元的那一个部分来确定可视电话设备主单元的方位。在图像拾取部分 1b 被插入在可视电话设备的右端时，假设可视电话设备的左端朝下放置，并且接收的图像通过接收图像旋转部分 5 相应地被旋转。因为图像拾取部分 1 由用户任意放置以便对象图像可以被以正常方位拾取，所以不需要对所拾取的图像执行旋转处理。

图 4 (a) 的例子是：可视电话设备主单元的纵向方向水平地放置在配置面以便可视电话设备主单元的上端可以位于图中左端。假设以图 4 (a) 的位置例子作为参考，由图像拾取部分 1b 拾取的图像的对象 11 的图像数据作为发送图像 12 以正常方位发送，不进行旋转处理。通过通信部分 4 接收的图像不经过旋转处理以正常方位被显示。

图 4 (b) 中的第二例子示出了从图 4 (a) 中的第一位置例子图像被旋转 180 度的情况。在这种情况下, 从远程用户发送的并由通信部分 4 接收的所接收的图像从正常方位反转 180 度出现在显示器 6b 上, 因此如果不执行旋转处理, 将以反转 180 度的图像进行显示。因此, 接受图像旋转部分 5 根据接收的图像对画面信号执行旋转处理, 以便使接收的图像的上端和根据由图像拾取垂直方向检测器 2b 检测的图像拾取部分 1 的垂直方向即显示器 6b 的方位的显示器 6b 的上端相一致。通过这个步骤, 已经过旋转处理的图像以正常方位被显示在显示器 6a 上。

图 4 (c) 中的第三例子示出了图 4 (a) 中的第一配置例子被逆时针旋转 90 度的情况。因此, 接收图像旋转部分 5 从参考方向中的图像 (即, 显示在图 4 (a) 中显示器 6b 上的图像) 将接收的图像按顺时针方向旋转 90 度。

使用这种方法, 可拆卸地在可视电话设备上提供图像拾取部分 1b 并且通过图像拾取部分 1b 的连接端子即图像拾取垂直方向检测器 2b 来检测可视电话设备主单元 10 的方位和显示器 6b 的方位是可能的。通过旋转图像以便根据显示器 6b 的方位以正常方位能够显示图像, 用户能够看到以正常方位接收的图像。

#### [第二实施例]

根据本发明第二实施例的可视电话设备通过根据显示装置的垂直方向旋转拾取图像和显示图像, 能够以正常状态发送拾取的图像和显示接收的图像, 而不管可视电话设备的交谈形式。

图 5 示出了根据本发明第二实施例的可视电话设备的配置的框图。图 6 示出了具有可拆卸的显示器 6c 的可视电话设备主单元配置的透视图。省略了图中与包括在第一实施例中的装置的相同部件的描述。

如图 5 所示, 根据第二实施例的可视电话设备具有图像拾取部分 1, 用于拾取对象图像并根据对象图像产生画面信号; 发送图像旋转部分 3, 用于接收来自图像拾取部分 1 的画面信号并对信号执行旋转处理; 以及通信部分 4, 用于调制并发送画面信号以便从当地用户通过无线连接或有线电路的通信电路发送。

根据第二实施例的可视电话设备还具有通信部分 4, 用于对通过无线连接或有线电路的通信电路接收的画面信号进行接收和解调; 相应于显示方向检测器装置的显示垂直方向检测器 13, 用于检测显示器 6 的垂直方向并确定

可视电话设备主单元的方位；接收图像旋转部分 5，用于接收解调的图形信号并根据由所述的显示垂直方向检测器 13 检测的显示器 6 的垂直方向对信号执行旋转处理；以及显示器 6，用于将已经过旋转处理的画面信号作为一个图像进行显示。假设可视电话设备主单元、图像拾取部分和显示器的方位和  
5 可视电话设备的方位是相同的。

对于发送操作，首先由图像拾取部分 1 拾取对象的图像。图像拾取部分 1 还将目标对象的图像数据转换成电信号以生成画面信号并输出该画面信号到发送图像旋转部分 3。在这个实例中，显示垂直方向检测器 13 检测显示器 6 的垂直方向，即，可视电话设备主单元的方位和图像拾取部分 1 的方位，  
10 并将结果输出到发送图像旋转部分 3 和接收图像旋转部分 5。显示垂直方向检测器 13 可以和图 2 中所示的相似。

下面，发送图像旋转部分 3，在接收显示器的垂直方向即图像拾取部分的方位上的信息和由图像拾取部分拾取的所拾取图像的画面信号时，对画面信号执行旋转处理以便该图像拾取部分 1 的垂直方向上的所拾取的图像的上  
15 端可以和将要发送到远程用户的图像的上端相一致。由发送图像旋转部分 3 处理的画面信号被通信部分 4 调制并通过通信电路被发送到远程用户。

对于接收操作，由通信部分 4 接收的画面信号被解调和输出到接收图像旋转部分 5。接收图像旋转部分 5 对画面信号执行旋转处理以便使接收图像的上端被显示在垂直方向上的显示器 6 的上端，即，以便根据有显示垂直方  
20 向检测器 13 检测的显示器 6 的垂直方向信息，从远程用户发送的图像可以被正常地显示在当地用户上。

下面，将参考图 6 描述根据这个实施例的可视电话设备的位置例子。

在图 6 中，可视电话设备包括：图像拾取部分 1c；显示垂直方向检测器 13a，也用作用于通过显示器 6c 连接的端子来检测显示器 6c 的垂直方向（即，  
25 用于检测可视电话设备主单元的方位）的可视电话设备主单元 10 的连接端子；以及显示器 6c，被可拆卸地提供在可视电话设备主单元上并提供在上端面（天线端）以及可视电话设备主单元 10 的右端和左端。图 6 (a) 到 (c) 示出了当使用免提形式时，可视电话设备主单元 10 的第一到第三位置的例子。省略图 6 和图 5 中所示的相同的部件的描述。

30 根据图 6 实施例的显示器 6c 被可拆卸地提供在可视电话设备主单元并根据显示器 6c 被插入在可视电话设备主单元的部分来确定可视电话设备主单元

的方位。在显示器 6c 被插入在可视电话设备的右端时，假设可视电话设备和其左端一起朝下放置并且通过发送图像旋转部分 5 相应地旋转所拾取的图像。因为用户任意地放置显示器 6c 以便对象图像可以按照正常方位被显示，所以不需要在拾取的图像上执行旋转处理。

5 图 6 (a) 的例子是：当可视电话设备主单元的纵向方向被水平置于配置面以便可视电话设备主单元的上部可以在图中左侧。假设以图 6 (a) 的配置例子作为参考，由图像拾取部分 11 拾取其图像的对象 11 的图像数据以正常方位作为发送图像 12 被发送，不做旋转处理。通过通信部分接收的图像以正常方位被显示。

10 图 6 (b) 中的第三配置例子示出了图像从图 6 (a) 中的第一配置例子被旋转 180 度的情况。在这种情况下，由图像拾取部分 1c 拾取其图像的对象作为上部朝下的对象 11 的图像被输出到发送图像旋转部分 3。因此，发送图像旋转部分 3 对对象的画面信号执行旋转处理以便图像拾取部分 1c 的上端在垂直方向上，即，根据由显示垂直方向检测器 13a 检测的显示器 6c 的垂直方向，  
15 使在垂直方向上的对象的上端可以和将被发送的图像的上部相一致，并通过通信部分 4 将作为发送图像 12 的结果信号发送到远程用户。

图 6 (c) 中的第三例子示出了图 6 (a) 中的可视电话设备主单元的第一位置例子被逆时针旋转 90 度的情况。因此，发送图像旋转部分旋转图像以便从参考方向中的图像（即，在图 6 (a) 中由图像拾取部分 1c 拾取的所拾取的  
20 图像）将拾取的图像按顺时针方向旋转 90 度。

使用这种方法，可拆卸地在可视电话设备上提供显示器 6c 并且通过显示器 6b 的连接端子，即显示垂直方向检测器 13c 来检测可视电话设备主单元 10 的方位和图像拾取部分 1c 的方位是可能的。根据图像拾取部分 1c 的方位，通过进行会话对于用户以正常方位发送图像以便其图像被拾取的对象的上端  
25 总是将要发送的图像的上端，这是可能的。

当显示器 6c 是可拆卸的以及显示垂直方向检测器 13a 作为图 6 的显示器 6c 的连接端子时，这不是用作限制，而是显示垂直方向检测器可以不同的形式分别提供在可视电话设备主单元的后面或前面。在这种情况下，必须通过接收图像旋转部分 5 根据显示垂直方向检测器 13a 检测的显示器 6c 的垂直方向  
30 向旋转接收的图像并确定图像是以正常方位被显示的。

当在本发明的第一和第二实施例中的可视电话设备安装有弯曲部分并可

折叠的矩形平行六面体时，这不是为了限制而是所拾取的图像的方位可以按照根据图像拾取的方位的要求被转换，并且将要显示的所接收的图像的方位可以按照根据显示器的方位的要求被转换。

### [第三实施例]

5 根据本发明第三实施例的可视电话设备根据 iii 的垂直方向通过旋转拾取的图像和显示的图像，能够以正常状态发送拾取的图像和显示接收的图像，而不管可视电话设备的交谈形式。而且根据第三实施例的可视电话设备根据可视电话设备的交谈形式，能够产生将通过通信装置发送到远程用户的语音数据以及通过通信装置从远程用户接收的语音数据。

10 图 7 示出了根据本发明第三实施例的可视电话设备的配置的框图。省略了图中与包括在第一和第二实施例中的相同的部件的相关描述。

如图 7 所示，根据本发明第三实施例的可视电话设备具有图像拾取部分 1，用于拾取对象图像并根据对象图像产生画面信号；图像拾取垂直方向检测器 2，用于检测图像拾取部分 1 的垂直方向；发送图像旋转部分 3，用于接收来自图像拾取部分 1 的画面信号并对信号执行旋转处理；以及通信部分 4，  
15 用于通过无线连接或有线电路的通信电路发送/接收并且调制/解调画面信号；接收图像旋转部分 5，用于接收解调后的画面信号并对该信号执行旋转处理；以及显示器 6，用于将已经过旋转处理的画面信号作为一个图像来显示。

根据第三实施例的可视电话设备还具有相应于第一接收装置作为接近式  
20 交谈接收器的第一接收器 14；相应于第二接收装置作为免提式交谈扬声器的第二接收器 15；相应于拾取的图像接收器选择器装置的拾取图像接收器选择器 16；相应于第一发送器装置作为接近式交谈麦克风的第一发送器 17；相应于第二发送器装置作为免提式交谈麦克风的第二发送器 18；以及相应于拾取的图像发送器选择器装置的拾取图像发送器选择器 19。第二接收器 15 具有  
25 音频电路，其放大率和第一接收器 14 的不同并且将从通信部分接收的音频信号恢复为一和第一接收器 14 不同的信号电平。第二发送器 18 具有和第一接收器 14 不同的放大率并且将输入音频信号恢复为一和第一接收器 14 不同的信号电平。假设可视电话设备主单元、图像拾取部分和显示器的方位和可视电话设备的方位是相同的。

30 根据图像拾取垂直方向检测器 2 的输出结果即根据可视电话设备主单元的方位，当可视电话设备主单元的方位适于接近式交谈时，如图 3 (c)、图 4

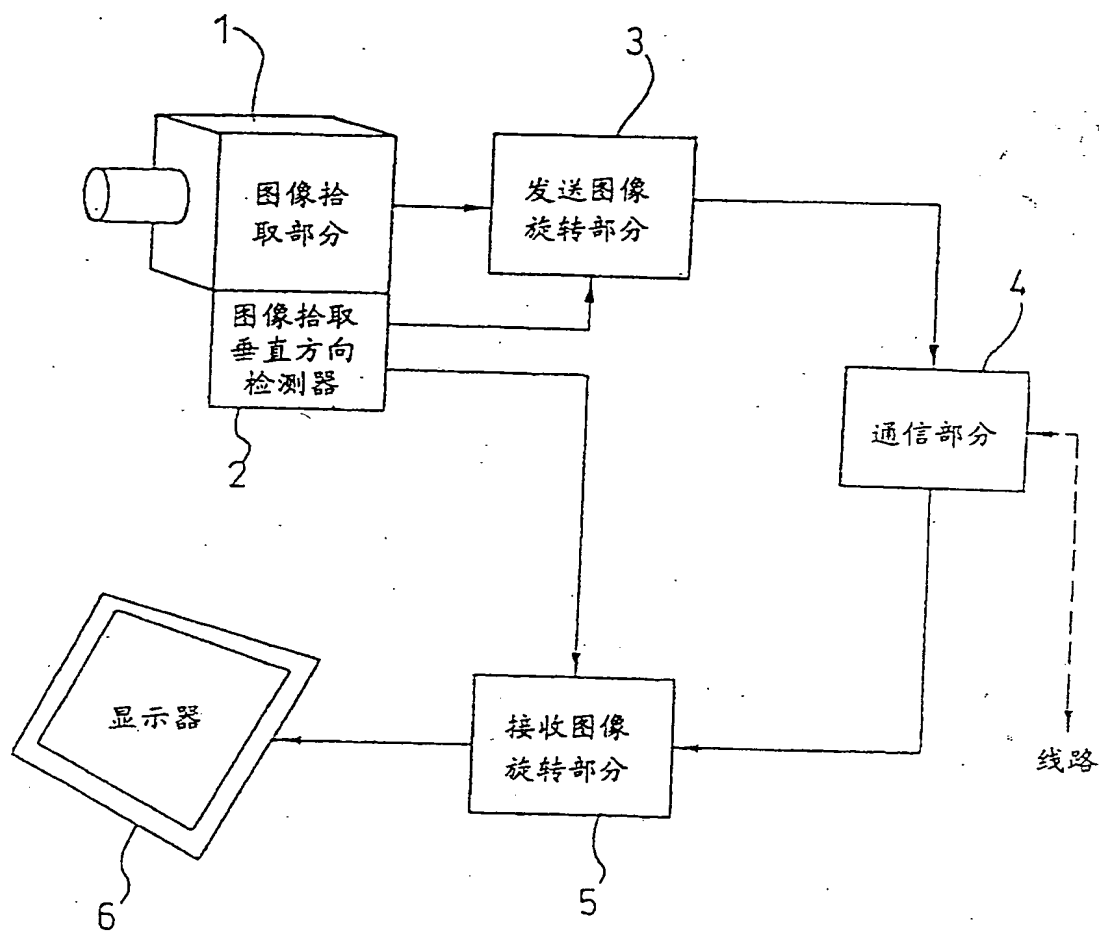


图 1



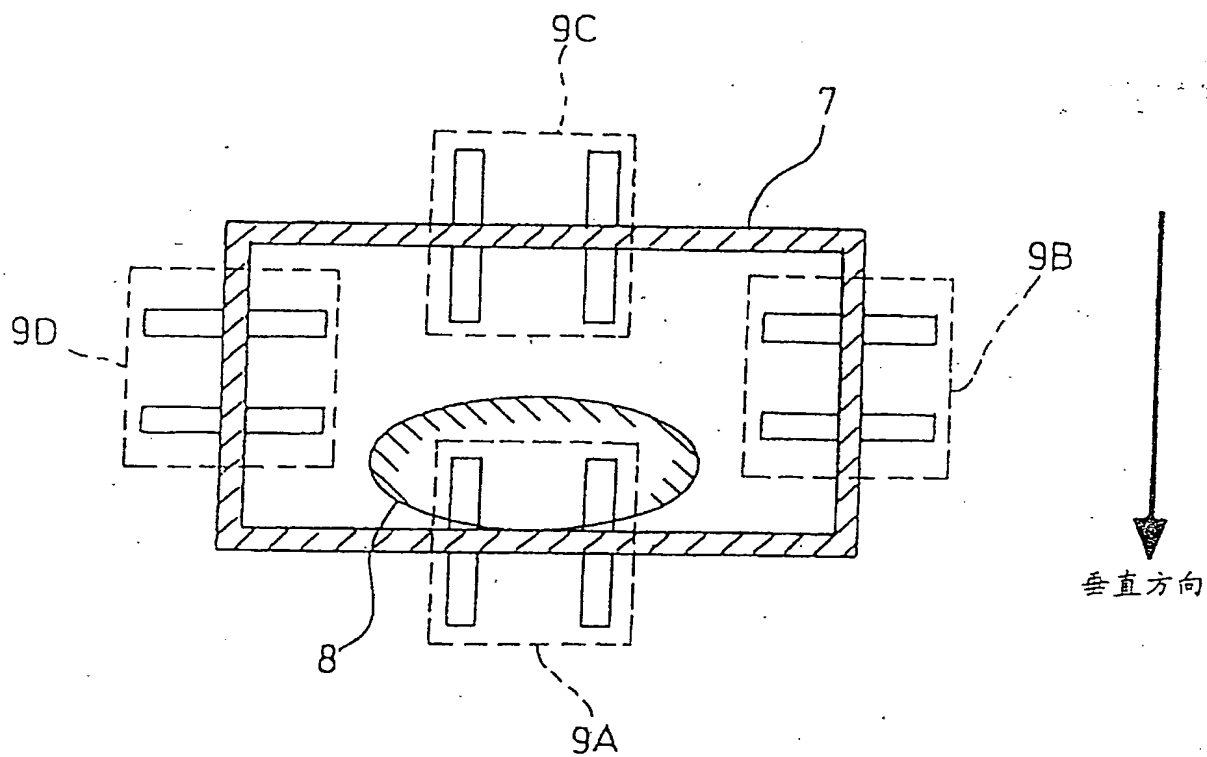


图 2

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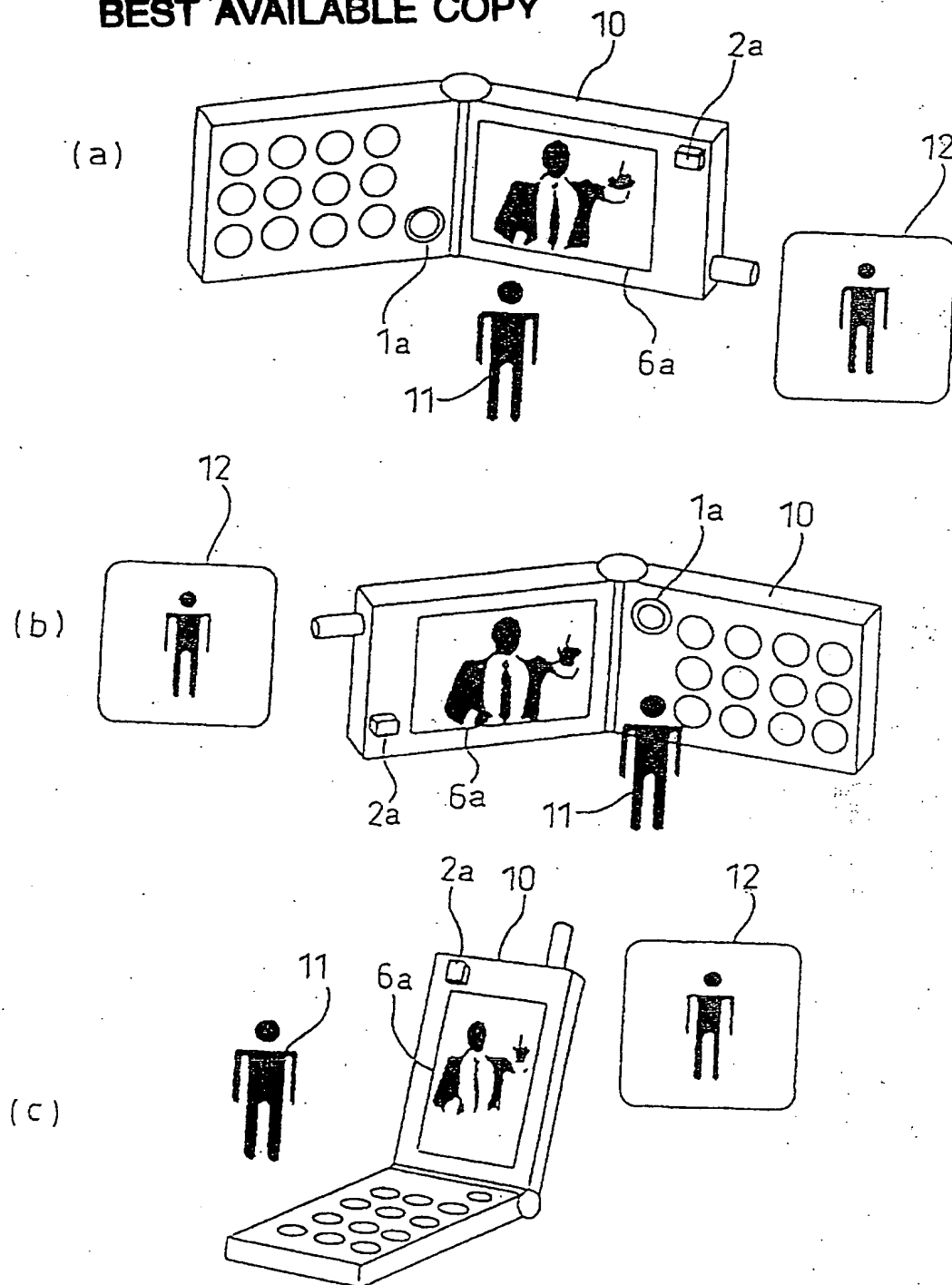


图 3

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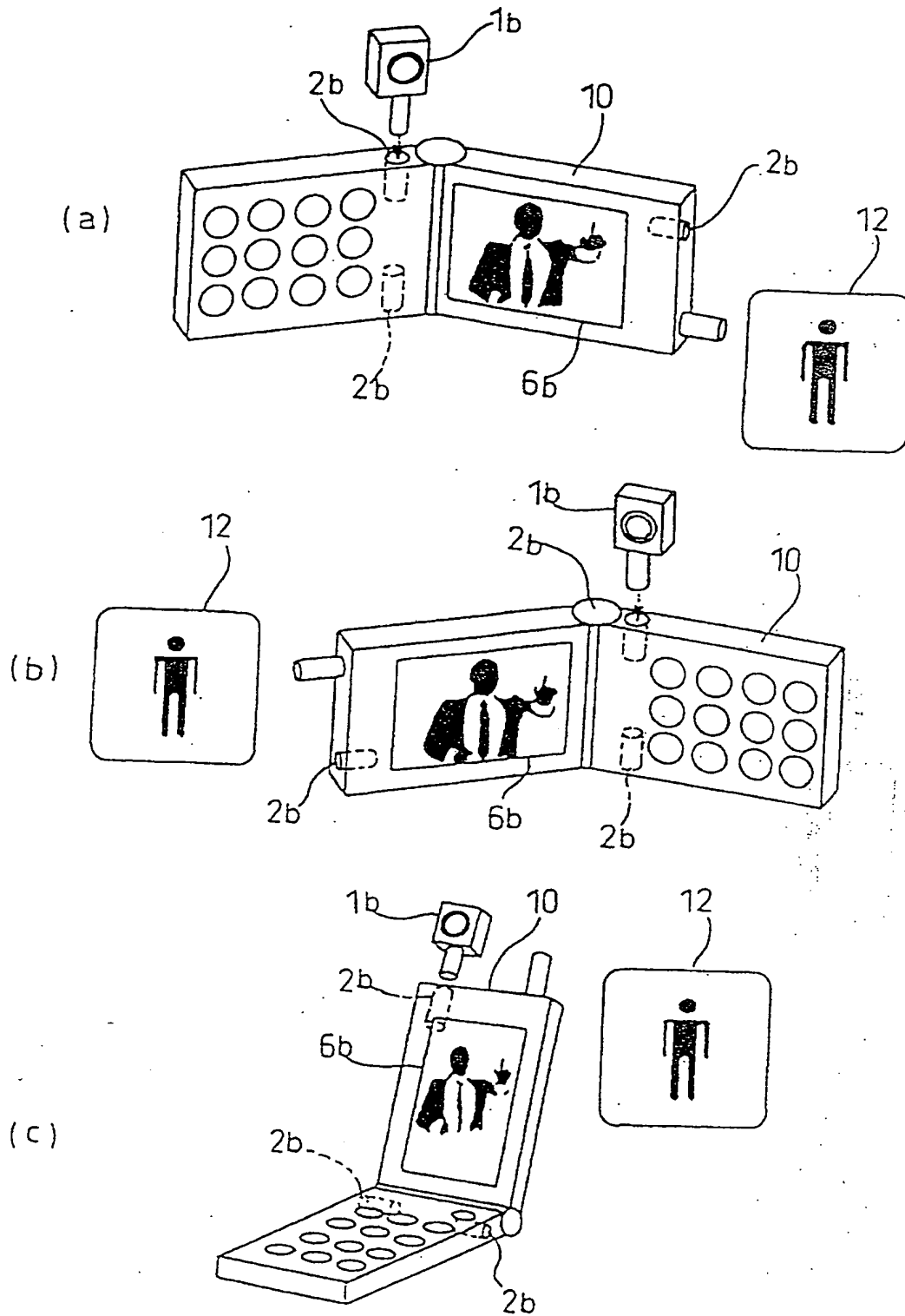


图 4

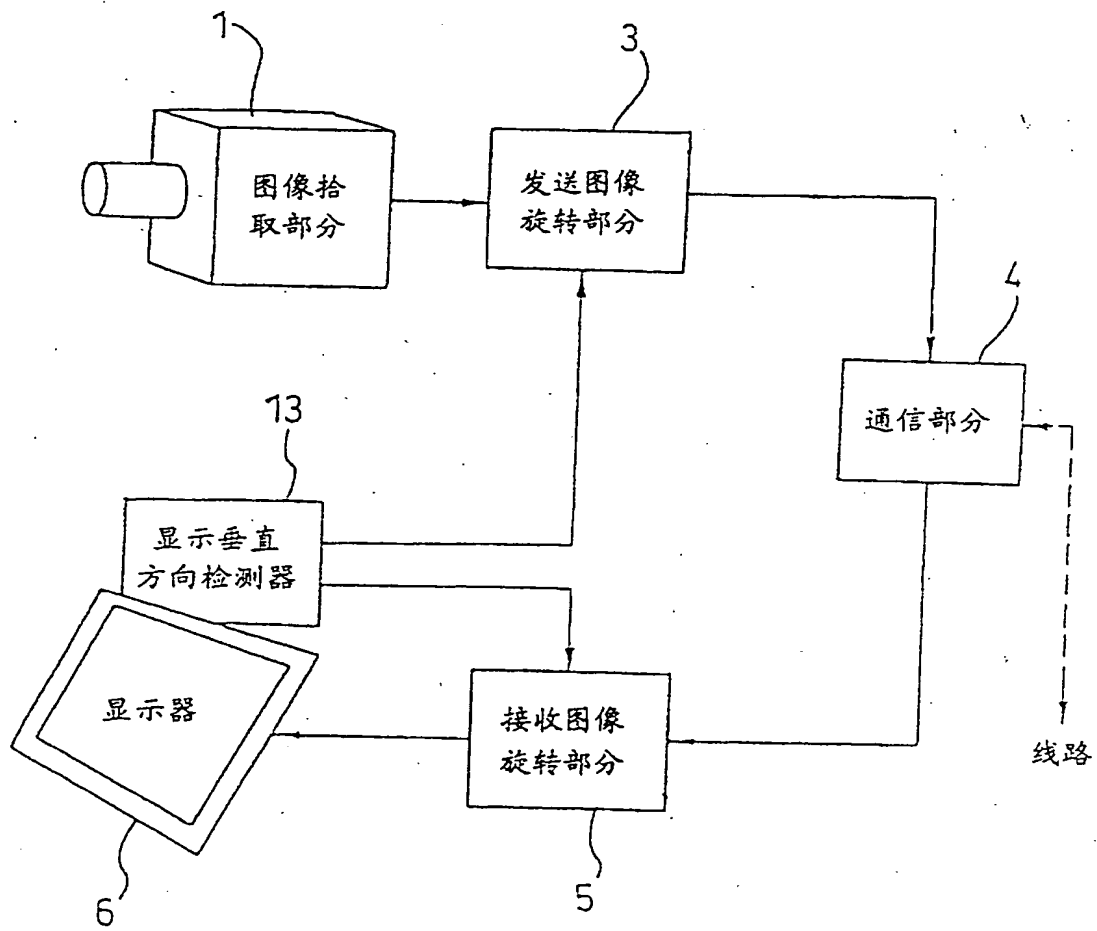


图 5

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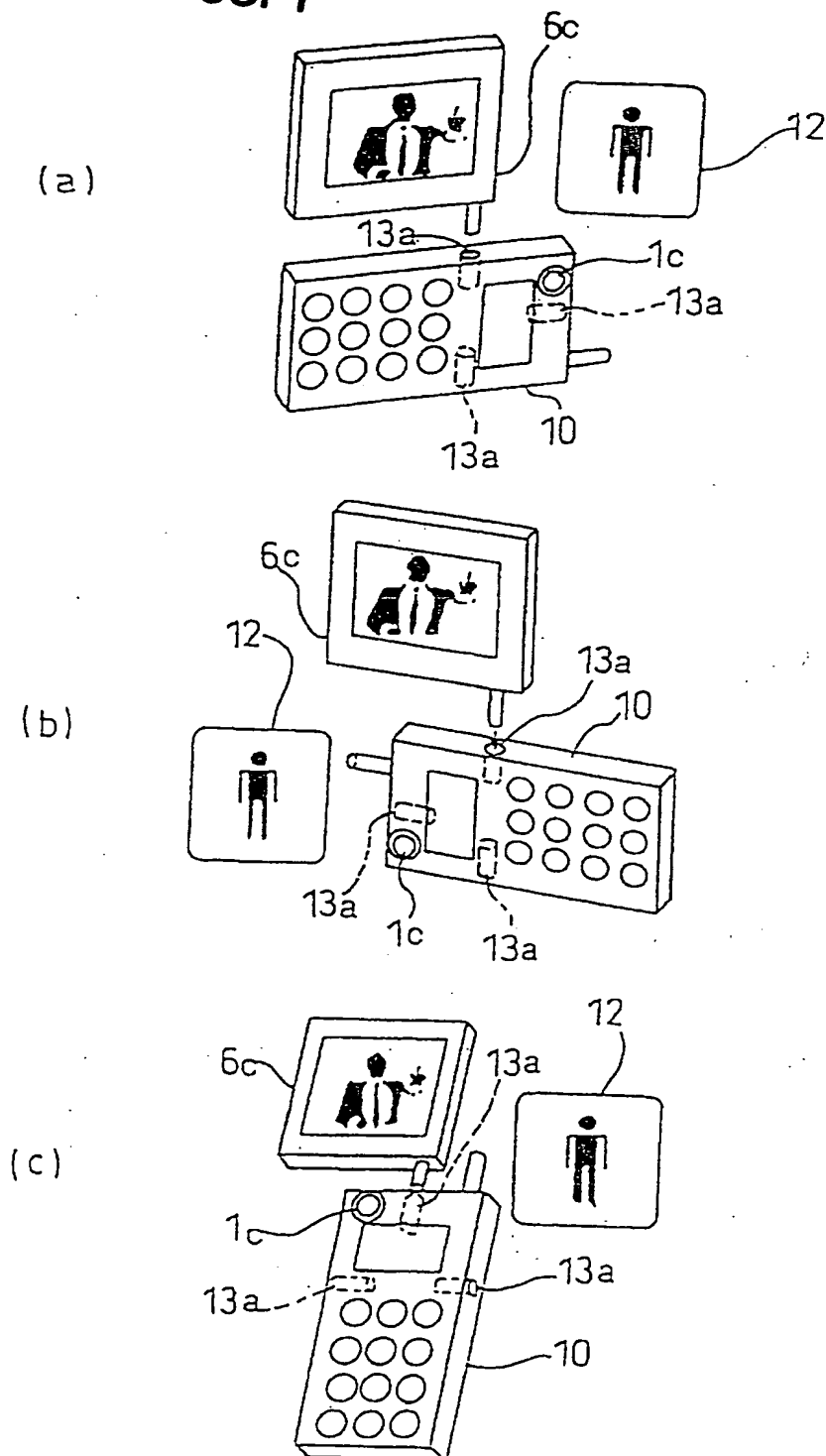


图 6